SIEMENS

Product Overview

RUGGEDCOM RS930W

Wireless Ethernet With Integrated 6-port Switch and Ethernet Over VDSL Interface, 128-bit Encryption

The wireless RUGGEDCOM RS930W from Siemens is a utility grade Ethernet switch which integrates an IEEE 802.11b/g wireless access point, with a fully managed wired 6-Port Ethernet switch providing six Fast Ethernet copper only ports and one Ethernet over VDSL (EoVDSL) interface. With the installation of the RS930W wireless access point, a network designer will achieve the integration of wired and wireless networks. The RS930W can be configured as an access, client, or bridge device. In addition, the EoVDSL can be used to connect a remote location back to the central control room using existing telephone grade cable (or other legacy serial cabling) at distances of up to 5km.

Designed to operate reliably in harsh environments the RS930W provides a high level of immunity to electromagnetic interference and heavy electrical surges typical of environments found in electric utility substations, curb side traffic control cabinets, and factory floors. An operating temperature range of -40°C to +85°C coupled with hazardous location compliance, optional conformal coating and a galvanized steel enclosure allows the RS930W to be placed in almost any location.

The RS930W functions as a wireless "client/bridge" within an IEEE 802.11b/g compliant WLAN. This allows the RS930W to transfer data for connected wired devices via an installed Wireless Access Point. The RS930W is capable of wireless data rates of up to 54Mbps whose bandwidth is available for the combined device traffic volume emanating from six Ethernet ports and one EoVDSL port. All wireless communications are protected by the very latest "robust security network" features including strong encryption protocols using WPA with TKIP and even WPA2/802.11i with 128-bit AES encryption. Static authentication support is provided by WPA-PSK. For authentication by an access point and a RADIUS server, the RS930W supports IEEE 802.1X/RADIUS for wireless user traffic and distributing dynamic encryption keys.

The embedded Rugged Operating System (ROS) provides advanced networking features such as Enhanced Rapid Spanning Tree (eRSTP), VLAN, Quality of Service, and a full array of intelligent functionality and advanced cyber security features for high network availability and manageability.

All RUGGEDCOM products are backed by a five year warranty and unsurpassed technical support.

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Features and benefits

Ethernet Ports

- Ethernet over VDSL (EoVDSL) interface
- 6 fast Ethernet ports (10/100BaseTX)

Ethernet Over VDSL Characteristics

- Up to 5km LAN segments
- Symmetric data rates up to 35 Mbps
- Asymmetric data rates up to 40 Mbps
- Frequency Division Multiplexing (FDM)

Cyber Security Features

- WPA (Wi-Fi Protected Access) with TKIP for enhanced security and encryption
- WPA2/802.11i with CCMP for robust security and 128-bit AES encryption
- IEEE 802.1X/RADIUS using EAP-PEAP for secure "enterprise class" authentication configuration
- Pre-shared Key Mode (PSK) for "personal" mode authentication configuration
- Multi-level user passwords
- SSH/SSL (128-bit encryption)
- Enable/disable ports, MAC based port security
- Port based network access control (802.1x)
- VLAN (802.1Q) to segregate and secure network traffic
- RADIUS centralized password management
- SNMPv3 authentication and 56-bit encryption

Rugged Rated for Reliability in Harsh Environments

- Immunity to EMI and heavy electrical surges
  - Meets IEEE 1613 (electric utility substations)
  - Exceeds IEC 61850-3 (electric utility substations)
  - Exceeds IEC 61800-3 (variable speed drive systems)
  - Exceeds IEC 61000-6-2 (generic industrial)
  - Exceeds NEMA TS-2 (traffic control equipment)
- -40°C to +85°C operating temperature (no fans)
- 20 AWG galvanized steel enclosure
- Hazardous Locations: Class 1, Division 2
- Universal Power Supply Options
- Fully integrated power supply (no external adaptors)
- Universal high-voltage range: 88-300VDC or 85-264VAC
- Dual low-voltage DC inputs: 24VDC (10-36VDC) or 48VDC (36-72VDC)
- Terminal blocks for reliable maintenance free connections
- CSA/UL 60950 safety approved to +85°C

Rugged Operating System (ROS) Features

- Simple plug and play operation – automatic learning, negotiation, and crossover detection
- MSTP (802.1Q-2005, formerly 802.1s)
- RSTP (802.1D-2004) and Enhanced Rapid Spanning Tree (eRSTP) network fault recovery (<5ms)
- Quality of Service (802.1p) for real-time traffic
- VLAN (802.1Q) with double tagging and GVRP support
- Link aggregation (802.3ad)
- IGMP snooping for multicast filtering
- Port rate limiting and broadcast storm limiting
- Port configuration, status, statistics, mirroring, security

Universal Power Supply Options

- Fully integrated power supply (no external adaptors)
- Popular low-voltage DC ranges: 24VDC (10-36VDC) or 48VDC (36-72VDC)
- Universal high-voltage range: 88-300VDC or 85-264VAC
- CSA/UL 60950 safety approved to +85°C
- Screw connection terminal blocks ensure reliable maintenance free connections

RUGGEDCOM Wireless RS930W

Operating Temperature
- -40°C to +85°C
- No fans

Hazardous Location Compliance
- Class 1, Division 2

EoVDSL Port
- One EoVDSL port
- RJ11 connector
- Symmetrical data rates up to 35Mbps

Fast Ethernet Ports
- 6 – Fast Ethernet Ports (10/100BaseTX)

Critical Alarm Relay
- Form-C failsafe contact relay: 1A@30VDC

Antenna
- Standard 3dBi
- Various antenna option packages available

Rugged Construction
- 20 AWG galvanized steel enclosure
- Conformal coating (optional)

Integrated Power Supply
- Universal high-voltage range: 88-300VDC or 85-264VAC
- Popular low voltage DC ranges: 24VDC (10-36VDC) 48VDC (36-72VDC)
- Dual isolated DC power inputs

Mounting Options
- DIN rail
- Panel mount

Wireless Specifications

- IEEE 802.11b/g compliant provides simultaneous support for both IEEE802.11b and IEEE802.11g wireless clients.
- Can be configured as an access, client or bridge device
- Antenna type: Removable, upgradeable 3dBi Antenna with R-SMA (male) connector
- Operating channels/frequency-range:
  - 11 channels, 2.400 - 2.4720 Ghz (US, Canada)
  - 13 channels, 2.400 - 2.4835 Ghz (ETSI)
  - 14 channels, 2.400 - 2.4970 Ghz (Japan)
- Data rates:
  - IEEE 802.11b: 11/5.5/2/1 Mbps with automatic failback
  - IEEE 802.11g: 54/48/36/24/18/12/9/6 Mbps with automatic failback
- Modulation technology:
  - IEEE 802.11b: DSSS over CCK (11/5 Mbps), DQPSK (2 Mbps), DBPSK (1 Mbps)
  - IEEE 802.11g: OFDM over 64QAM, 16QAM, QPSK, BPSK
- Transmit power:
  - IEEE 802.11b: 20dBm nominal @ 11 Mbps
  - IEEE 802.11g: 16dBm nominal @ 54 Mbps
- Receiver sensitivity:
  - IEEE 802.11b: -88dBm @ 11 Mbps with 8% FER
  - IEEE 802.11g: -74dBm @ 54 Mbps with 10% FER

ROS Features

Cyber Security

Cyber security is an urgent issue in many industries where advanced automation and communications networks play a crucial role in mission critical applications and where high reliability is of paramount importance. Key ROS features that address security issues at the local area network level include:

- **Passwords** – Multi-level user passwords secures switch against unauthorized configuration
- **SSH / SSL** – Extends capability of password protection to add 128-bit encryption of passwords and data as they cross the network
- **Enable/Disable ports** – Capability to disable ports so that traffic can not pass
- **802.1Q VLAN** – Provides the ability to logically segregate traffic between predefined ports on switches
- **MAC based port security** – The ability to secure ports on a switch so only specific Devices / MAC addresses can communicate via that port
- **802.1x Port based network access control** – The ability to lock down ports on a switch so that only authorized clients can communicate via this port
- **RADIUS** – authentication service using MD5 hash and providing centralized password management
- **SNMPv3** – encrypted authentication access security and data encryption (CBC-DES with 56-bit encryption key)
- **Secure socket layer** – Web-based management using SSL with data encryption (128-bit encryption key)
- **RSA** – 1024 bit key for key management and key exchange
- **TACACS+** – Terminal Access Control and Accounting Services. Client provides encrypted authentication and authorization
- **Point to Point (PPP)** – using CHAP (MD5 Hash) authentication service
- **SFTP** – Secure File Transfer Protocol using SSH encryption

The ROS cyber security features are included to help address the various industry specific security standards such as NERC CIP, ISA S99, AGA 12, IEC 62443, ISO 17799:2005 and PCSRF SPP-ICS.

Enhanced Rapid Spanning Tree Protocol (eRSTP)

RUGGEDCOM eRSTP allows the creation of fault-tolerant ring and mesh Ethernet networks that incorporate redundant links that are 'pruned' to prevent loops. eRSTP yields worst-case fault recovery [1] of 5ms times the 'bridge diameter' and allows rings of up to 160 switches. For example, a ring of ten switches will have fault recovery times under 50ms. eRSTP implements both STP and RSTP to ensure interoperability with commercial switches unlike other proprietary 'ring' solutions.

[1] eRSTP fault recovery times may be approximated as follows:
For 100 Mbps, fault recovery performance is <5ms/hop
For 1,000 Mbps, fault recovery performance is <5ms/hop + 20ms

Quality of Service (IEEE 802.1p)

Some networking applications such as real-time control or VoIP (voice over IP) require predictable arrival times for Ethernet frames. Switches can introduce latency in times of heavy network traffic due to the internal queues that buffer frames and then transmit on a first come first serve basis. ROS supports 'Class of Service' in accordance with IEEE 802.1p that allows time critical traffic to jump ahead to the front of the queue thus minimizing latency and reducing jitter to allow such demanding applications to operate correctly. ROS allows priority classification by port, tags, MAC address, and IP type of service (ToS). A configurable "weighted fair queuing" algorithm controls how frames are emptied from the queues.

VLAN (IEEE 802.1Q)

Virtual local area networks (VLAN) allow the segregation of a physical network into separate logical networks with independent broadcast domains. A measure of security is provided since hosts can only access other hosts on the same VLAN and traffic storms are isolated. ROS supports 802.1Q tagged Ethernet frames and VLAN trunks. Port based classification allows legacy devices to be assigned to the correct VLAN. GVRP support is also provided to simplify the configuration of the switches on the VLAN.

Link Aggregation (802.3ad)

The link aggregation feature provides the ability to aggregate several Ethernet ports into one logical link (port trunk) with higher bandwidth. This provides an inexpensive way to set up a high speed backbone to improve network bandwidth. This feature is also known as "port trunking," "port bundling," "port teaming," and "Ethernet trunk."

IGMP Snooping

ROS uses IGMP snooping (Internet Group Management Protocol v1&v2) to intelligently forward or filter multicast traffic streams (e.g. MPEG video) to or from hosts on the network. This reduces the load on network trunks and prevents packets from being received on hosts that are not involved. ROS has a very powerful implementation of IGMP snooping that:

- Can be enabled on a per VLAN basis
- Detects and filters all multicast streams regardless of whether subscribers exist
- Supports "router-less" operation by supporting an "active" mode
- Restores traffic streams immediately after an RSTP topology change

ROS features

SNMP (Simple Network Management Protocol)

SNMP provides a standardized method for network management stations to interrogate devices from different vendors. SNMP versions supported by ROS are v1, v2c, and v3. SNMPv3, in particular, provides security features such as authentication, privacy with data encryption (CBC-DES with 56-bit encryption key) and access control not present in earlier SNMP versions. ROS also supports numerous standard MIBs (Management Information Base) allowing for easy integration with any network management system (NMS).

A feature of SNMP supported by ROS is the ability to generate "traps" upon system events. RUGGECOM NMS, the RUGGEDCOM management solution, can record traps from multiple devices providing a powerful network troubleshooting tool. It also provides a graphical visualization of the network and is fully integrated with all RUGGEDCOM products.

SNTP (Simple Network Time Protocol)

SNTP automatically synchronizes the internal clock of all ROS devices on the network. This allows for correlation of time stamped events for troubleshooting.

SCADA and Industrial Automation

ROS contains features that optimize network performance and simplify switch management based on the unique requirements found in SCADA and industrial automation applications. Features such as Modbus TCP management for retrieval of switch data using the ubiquitous Modbus protocol and DHCP Option 82, a Rockwell Automation ODVA requirement for IP address assignment based on the location of the end device, provide capabilities not found in typical "commercial" or "office grade" Ethernet switches.

Port Based Network Access control (802.1x)

ROS supports the IEEE 802.1x standard that defines a mechanism for port-based network access control which provides a means of authenticating and authorizing devices attached to LAN ports.

Port Rate Limiting

ROS supports configurable rate limiting per port to limit unicast and multicast traffic. This can be essential to managing precious network bandwidth for service providers. It also provides edge security for denial of service (DoS) attacks.

Broadcast Storm Filtering

Broadcast storms wreak havoc on a network and can cause attached devices to malfunction. This could be disastrous on a network with mission critical equipment. ROS limits this by filtering broadcast frames with a user-defined threshold.

Port Mirroring

ROS can be configured to duplicate all traffic on one port to a designated mirror port. When combined with a network analyzer, this can be a powerful troubleshooting tool.

Loss of Link Management

Some intelligent electronic devices (IEDs) have dual fiber optic ports with automatic failover to a backup port should the primary fail. ROS ensures this mechanism works reliably under all failure modes by appropriately disabling link signals when required. ROS also flushes learned MAC addresses to ensure the failover occurs quickly.

Port Configuration and Status

ROS allows individual ports to be 'hard' configured for speed, duplex, auto-negotiation, flow control and more. This allows proper connection with devices that do not negotiate or have unusual settings. Detailed status of ports with alarm and SNMP trap on link problems aid greatly in system troubleshooting.

Port Statistics and RMON (Remote monitoring)

ROS provides continuously updating statistics per port that provide both ingress and egress packet and byte counters as well as detailed error figures. Also provided is full support for the RMON statistics, history, alarms, and event groups. RMON allows for very sophisticated data collection, analysis and detection of traffic patterns.

Event Logging and Alarms

ROS records all significant events to a non-volatile system log allowing forensic troubleshooting. Events include link failure and recovery, unauthorized access, broadcast storm detection, and self-test diagnostics among others. Alarms provide a snapshot of recent events that have yet to be acknowledged by the network administrator. An external hardware relay is de-energized during the presence of critical alarms allowing an external controller to react if desired.

HTML Web Browser and Telnet/SSH User Interfaces

ROS provides a simple, intuitive user interface for configuration and monitoring via a standard graphical web browser or via Telnet/SSH. All system parameters include detailed on-line help to make setup a breeze. ROS, presents a common look and feel and standardized configuration process allowing easy migration to other RUGGEDCOM managed products.

Configuration Via ASCII Text File

All configuration parameters are stored in an ASCII formatted text file that can easily be transferred via TFTP, SFTP or Xmodem. The configuration file can be saved for backup purposes and easily manipulated by a text editor. The same text file can be downloaded to the switch at a later date in order to re-configure or restore a previous configuration.

Command Line Interface (CLI)

A command line interface can be used in conjunction with remote shell to automate data retrieval, configuration updates, and firmware upgrades. A powerful SQL-like capability allows expert users the ability to selectively retrieve or manipulate any parameters the device has to offer.

EMI and environmental type tests

IEC 61850-3 EMI type tests				
Test	**Description**		**Test levels**	**Severity levels**
IEC 61000-4-2	ESD	Enclosure contact	+/- 8kV	4
		Enclosure air	+/- 15kV	4
IEC 61000-4-3	Radiated RFI	Enclosure ports	20 V/m	Note 1
IEC 61000-4-4	Burst (fast transient)	Signal ports	+/- 4kV @ 2.5kHz	Note 1
		D.C. power ports	+/-4kV	4
		A.C. power ports	+/-4kV	4
		Earth ground ports [3]	+/-4kV	4
IEC 61000-4-5	Surge	Signal ports	+/-4kV line-to-earth, +/- 2kV line-to-line	4
		D.C. power ports	+/-2kV line-to-earth, +/- 1kV line-to-line	3
		A.C. power ports	+/-4kV line-to-earth, +/- 2kV line-to-line	4
IEC 61000-4-6	Induced (conducted) RFI	Signal ports	10V	3
		D.C power ports	10V	3
		A.C power ports	10V	3
		Earth ground ports [3]	10V	3
IEC 61000-4-8	Magnetic field	Enclosure ports	40 A/m continuous, 1000 A/m for 1 s	Note 1
			1000 A/m for 1 s	5
IEC 61000-4-29	Voltage dips and interrupts	D.C. power ports	30% for 0.1s, 60% for 0.1s, 100% for 0.05s	N/A
		A.C. power ports	30% for 1 period, 60% for 50 periods	N/A
IEC 61000-4-11			100% for 5 periods, 100% for 50 periods	N/A
IEC 61000-4-12	Damped oscillatory	Signal ports	2.5kV common, 1kV diff. mode@1MHz	3
		D.C. power ports	2.5kV common, 1kV diff. mode@1MHz	3
		A.C. power ports	2.5kV common, 1kV diff. mode@1MHz	3
IEC 61000-4-16	Mains frequency voltage	Signal ports	30V Continuous, 300V for 1s	4
		D.C. power ports	30V Continuous, 300V for 1s	4
IEC 61000-4-17	Ripple on D.C. power supply	D.C. power ports	10%	3
IEC 60255-5	Dielectric strength	Signal ports	2k V AC (Fail-safe relay output)	N/A
		D.C. power ports	1.5V DC	N/A
		A.C. power ports	2k V AC	N/A
IEC 60255-5	H.V. Impulse	Signal ports	5kV (Fail-safe relay output)	N/A
		D.C. Power ports	5kV	N/A
		A.C. Power ports	5kV	N/A

IEEE 1613 (C37.90.x) EMI immunity type tests [2]				
Test	**Description**		**Test levels**	**Severity levels**
IEEE C37.90.3	ESD	Enclosure contact	+/-2kV, +/-4kV, +/- 8kV	N/A
		Enclosure air	+/-4kV, +/-8kV, +/-15kV	N/A
IEEE C37.90.2	Radiated RFI	Enclosure ports	35 V/m	N/A
IEEE C37.90.1	Fast transient	Signal ports	+/-4kV @ 2.5kHz	N/A
		D.C. power ports	+/-4kV	N/A
		A.C. power ports	+/-4kV	N/A
		Earth ground ports [3]	+/-4kV	N/A
IEEE C37.90.1	Oscillatory	Signal ports	2.5kV common mode@1MHz	N/A
		D.C. power ports	2.5kV common, 1kV diff. mode@1MHz	N/A
		A.C. power ports	2.5kV common, 1kV diff. mode@1MHz	N/A
IEEE C37.90	H.V. impulse	Signal ports	5kV (Fail-safe relay output)	N/A
		D.C. power ports	5kV	N/A
		A.C. power ports	5kV	N/A
IEEE C37.90	Dielectric strength	Signal ports	2k V AC	N/A
		D. C. power ports	1.5k V DC	N/A
		A. C. power ports	2k V AC	N/A

Environmental type tests				
Test	**Description**		**Test levels**	**Severity levels**
IEC 60068-2-1	Cold temperature	Test Ad	-40°C, 16 hours	N/A
IEC 60068-2-2	Dry heat	Test Bd	+85°C, 16 hours	N/A
IEC 60068-2-30	Humidity (damp heat, cyclic)	Test Db	95% (non-condensing), 55°C , 6 cycles	N/A
IEC 60255-21-1	Vibration	Test Fc	2g @ (10 - 150) Hz	Class 2 [2]
IEC 60255-21-2	Shock	Test Ea	30g @ 11mS	Class 2 [2]

1 RUGGEDCOM specified severity levels.

2 Class 2 refers to "Measuring relays and protection equipment for which a very high security margin is required or where the vibration levels are very high, (e.g. shipboard application and for severe transportation conditions").

3 Only applicable to functional earth connections separated from the safety earth connection.

Technical specifications

Power Supply
- Power Consumption: 10W Max
- 24VDC: 10-36VDC, 0.4A
- 48VDC: 36-72VDC, 0.2A
- HI Voltage AC/DC: 88-300VDC, 85-264VAC, 0.1A

Critical Alarm Relay
- Form-C failsafe contact relay: 1A@30VDC

Physical Dimensions
- Height: 7.4" (188mm)
- Width: 2.6" (66mm)
- Depth: 5.0" (127mm)
- Weight: 1.22 kg
- Ingress Protection: IP40 (1mm objects)
- Enclosure: 20 AWG galvanized steel enclosure
- Mounting: DIN rail or panel mounted

Switch Properties
- Switching method: Store and forward
- Switching latency: 8 us (100Mbps)
- Switching bandwidth: 1.8 Gbps
- MAC address table size: 16kbytes
- Priority queues: 4
- Frame buffer memory: 1 Mbit
- Simultaneous VLANs: 255
- VLAN ID range: 1 to 4094
- IGMP and static multicast groups: 256
- Port rate limiting: 128kbps, 256, 512, 4, 8Mbps
- No head of line blocking

Regulatory Approvals
- ISO: Designed and manufactured using a ISO9001: 2000 certified quality program
- CE marking
- Emissions: FCC Part 15 (Class A), EN55022 (CISPR22 Class A)
- Safety: cCSAus (Compliant with CSA C22.2 No. 60950, UL 60950, EN60950)
- Laser eye safety (FDA/CDRH): Complies with 21 CFR Chapter 1, Subchapter J

Network Management
- HTTPS graphical web-based, SSL (128-bit encryption)
- SNMP v1, v2c, v3 (56-bit encryption)
- Telnet, VT100, SSH/SFTP (128-bit encryption)
- Command Line Interface (CLI)
- RSA key management (1024 bit key)
- Authentication and accounting - TACACS+ (encrypted), RADIUS client, PPP

Warranty
- 5 Years – Applicable to design and manufacturing related product defects.

EMI Immunity and Environmental Compliance
- IEC 61000-6-2 Industrial (Generic)
- IEC 61800-3 Industrial (Variable Speed Drive Systems)
- IEC 61850-3 Electric Utility Substations
- IEEE 1613 Electric Utility Substations
- NEMA TS 2 Traffic Control Equipment
- Hazardous Locations: Class 1, Division 2

IEEE Compliance
- 802.3-10BaseT
- 802.3u-100BaseTX, 100BaseFX
- 802.3x-Flow Control
- 802.3z-1000BaseLX
- 802.3ab-1000BaseTX
- 802.3ad-Link Aggregation
- 802.1d-MAC Bridges
- 802.1d-Spanning Tree Protocol
- 802.1p-Class of Service
- 802.1Q-VLAN Tagging
- 802.1w-Rapid Spanning Tree Protocol
- 802.1x-Port Based Network Access Control
- 802.1Q-2005 (formerly 802.1s) MSTP

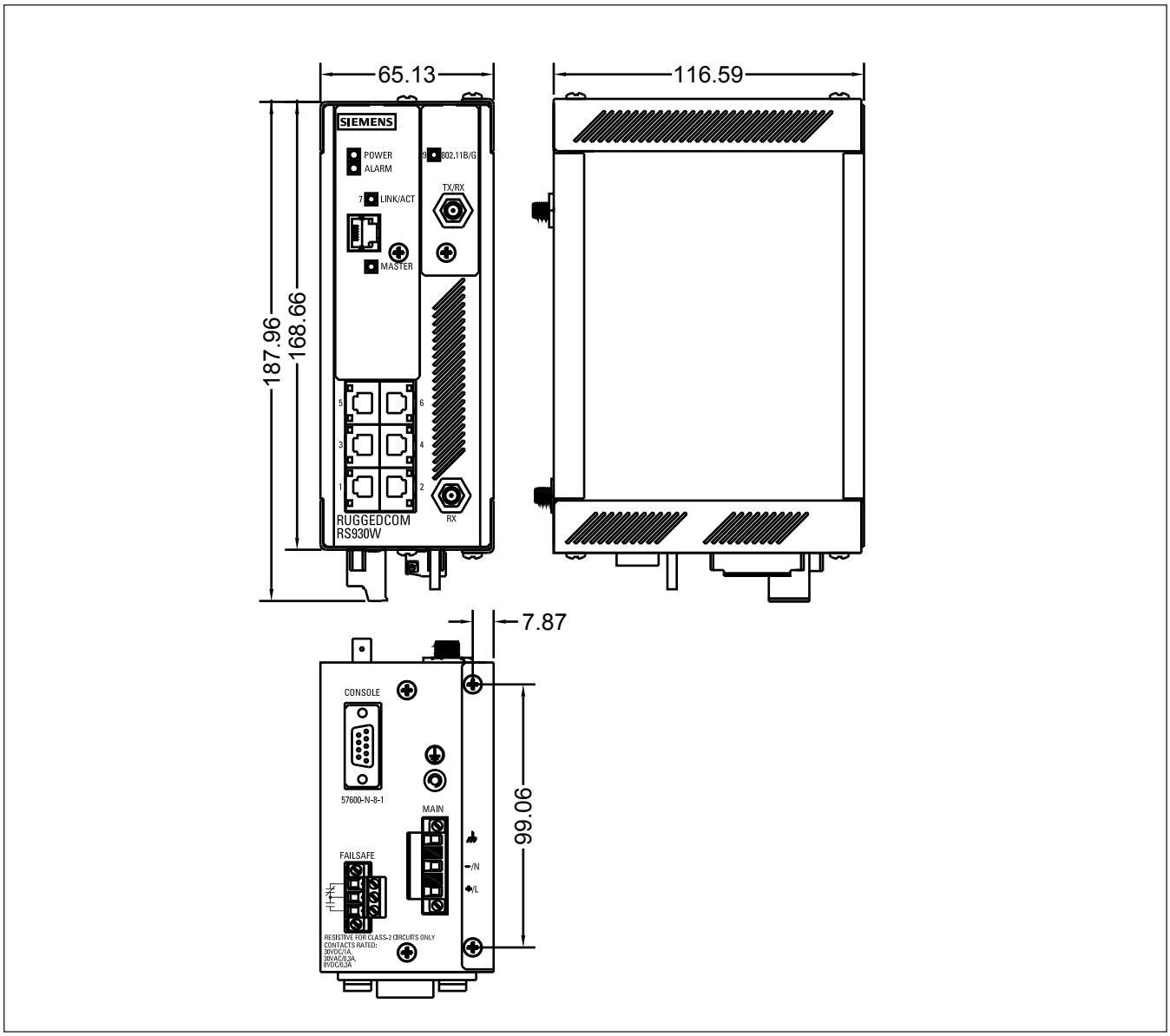
IETF RFC Compliance
- RFC768-UDP
- RFC783-TFTP
- RFC791-IP
- RFC792-ICMP
- RFC793-TCP
- RFC826-ARP
- RFC854-Telnet
- RFC894-IP over Ethernet
- RFC1112-IGMP v1
- RFC1519-CIDR
- RFC1541-DHCP (client)
- RFC2030-SNTP
- RFC2068-HTTP
- RFC2236-IGMP v2
- RFC2284-EAP
- RFC2475-Differentiated Services
- RFC2865-RADIUS
- RFC3414-SNMPv3-USM
- RFC3415-SNMPv3-VACM

IETF SNMP MIBS
- RFC1493-BRIDGE-MIB
- RFC1907-SNMPv2-MIB
- RFC2012-TCP-MIB
- RFC2013-UDP-MIB
- RFC2578-SNMPv2-SMI
- RFC2579-SNMPv2-TC
- RFC2819-RMON-MIB
- RFC2863-IF-MIB
- draft-ietf-bridge-rstpmib-03-BRIDGE-MIB
- draft-ietf-bridge-bridgemib-smiv2-03-RSTP-MIB
- IANAifType-MIB

Fiber Specifications and Dimension Drawings

Fiber Optical Specifications				
Parameter	**Fiber Port Type**			
Mode	Multimode	Singlemode	Singlemode	Singlemode
Connector	MTRJ, ST, SC	LC, SC, ST	LC, SC, ST	LC, SC, ST
Typical Dist. (km)	2	20	50	90
Optical Wavelength (nm)	1310	1310	1310	1310
Cable Size Core/Cladding (um)	50 / 125 or 62.5 / 125	8 / 125 or 9 / 125	8 / 125 or 9 / 125	8 / 125 or 9 / 125
TX Power (Min/Max) (dBm)	-9.5 / -4	-9/-3	-7 / -3	0 / 5
RX Sensitivity (dBm)	-15.7	-15.5	-2.5	-2.5
RX Saturation (dBm)	-33.5	-32	-37	-39
Typical Budget (dB)	17	16.5	34.5	41.5

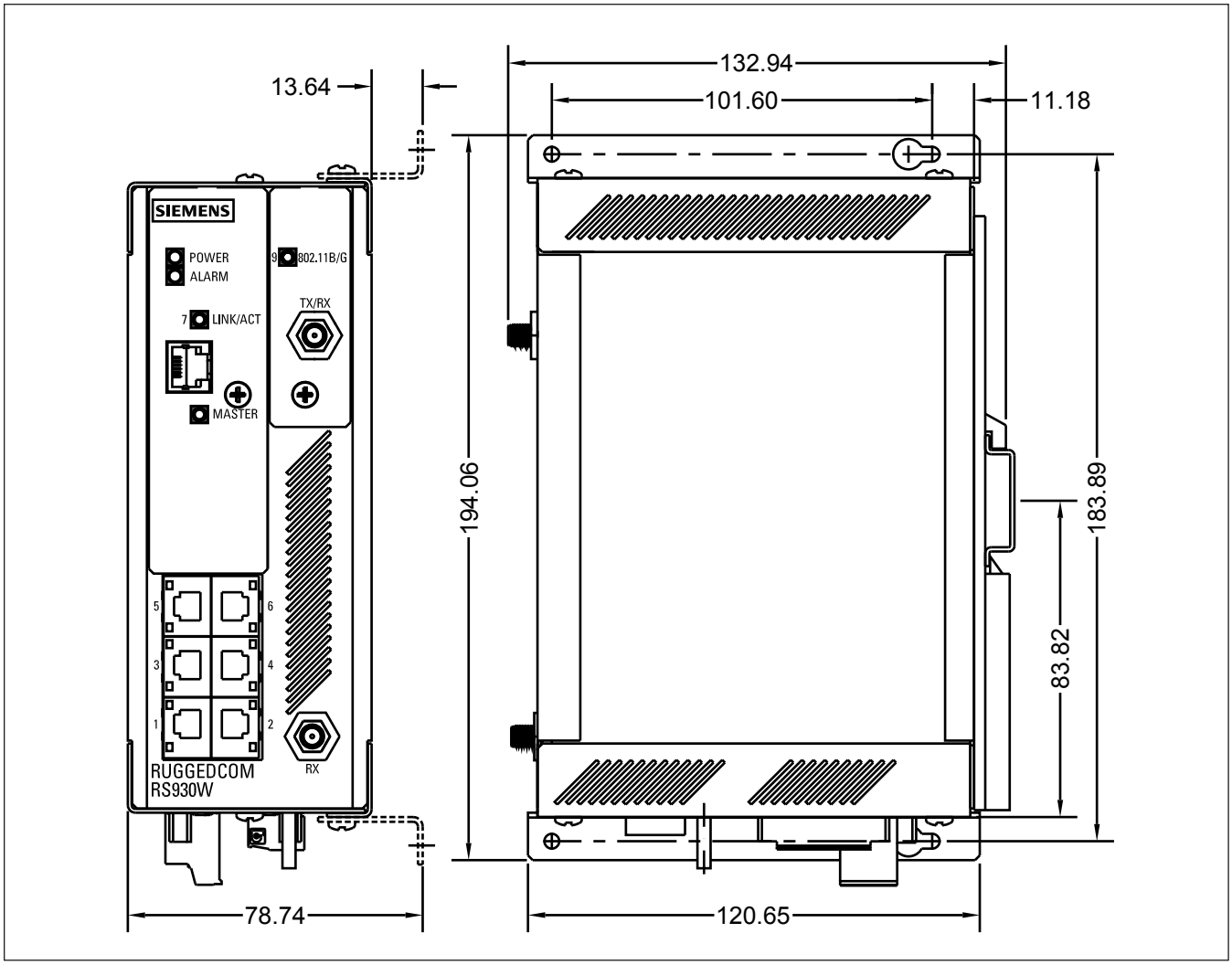
Longer segment lengths dependent on fiber specifications. Consult factory for further details.



Overall dimensions

All dimensions are in millimeters, unless otherwise stated.

Dimension Drawings



Panel and DIN rail mount dimensions

All dimensions are in millimeters, unless otherwise stated.

Order Codes

6GK60930AW2	_____ - 0 - _____ - A - _____ - Z _____ + _____				
	PS1	Mount	MOD	VV	WW

PS1: Power supply 1
1 = 24 VDC (10-36 VDC)
2 = 48 VDC (36-72 VDC)
3 = 88-300VDC or 85-264VAC

Mount: Mounting options
A = No Mounting Option
B = DIN Rail Mounting
C = Panel Mounting

MOD: Manufacturing modifications
0 = None
1 = Conformal coating

VV: VDSL interface
A01 = Standard reach (up to 2.5km)
A02 = Long Reach (5km) Master / CO
A03 = Long Reach (5km) / CPE

WW: Wireless option
B01 = 802.11 – US (North America)
B02 = 802.11 – EU (European Union)
B03 = 802.11 – CH (China)
B04 = 802.11 – AU (Australia)
B05 = 802.11 – IN (India)

Power cables
6GK6000-8BB00-0AA0 – Bare-wire
6GK6000-8BA00-0AA0 – with lugs

Example order codes

6GK6093-0AW21-0AA0-Z A01+B01
24 VDC (10-36 VDC), No Mounting Hardware, Standard reach (under 2.5km) VDSL Interface, 802.11 - US (North America)

6GK6093-0AW21-0BA1-Z A03+B01
24 VDC (10-36 VDC), DIN Rail Mounting, Conformal Coating, Long reach (5km) /CPE VDSL Interface, 802.11 - US (North America)

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